

CLAIMS

1. Shear controlling apparatus for an extruder or pumping device (1), said extruder (1) comprising a conveying means (2, 3, 4), a die plate and a variable
5 restriction positioned between the conveying means (2, 3, 4) and the die plate, c h a r a c t e r i s e d by said variable restriction being constructed to provide a symmetrical flow through the restriction.
2. Apparatus in accordance with claim 1, c h a r a c t e r i s e d by said
10 variable restriction comprising an annular insert (Figure 5) and a co-axially mounted piston (Figures 3, 7) movable relative to one another in the axial direction for changing the flow resistance.
3. Apparatus in accordance with claim 2, c h a r a c t e r i s e d by said annular
15 insert (Figure 5) comprising a circular opening and said piston (Figures 3, 7) having a circular cross-section.
4. Apparatus in accordance with claim 3, c h a r a c t e r i s e d by said annular
20 insert (Figure 5) and/or said piston (Figures 3, 7) having a frusto-conical formation directed towards one another.
5. Apparatus in accordance with any of the preceding (Figures 4, 6) claims 2-4, c h a r a c t e r i s e d by the piston (Figures 3, 7) being mounted in a die base insert (Figures 4, 6) positioned downstream of the conveying means (2, 3, 4) and the
25 piston (Figures 3, 7) being controlled in its axial position by means of a hydraulic piston-cylinder unit incorporated in the die base insert (Figures 4, 6).
6. Apparatus in accordance with claim 5, c h a r a c t e r i s e d by the die base
30 insert (Figures 4, 6) comprising radially extending vanes providing a resistance against rotational movement of the extruded material passing by this insert.
7. Apparatus in accordance with claim 6, c h a r a c t e r i s e d by the
35 hydraulic connection to the piston-cylinder unit being provided through the radial vanes of the die base insert (Figures 4, 6).

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8. Apparatus in accordance with any of the preceding claims, characterised by the die plate comprising axially extending die openings.

9. Apparatus in accordance with any of the preceding claims 1-7, characterised by the die plate comprising radially extending die openings.

10. Apparatus in accordance with any of the preceding claims, characterised by the conveying means (2, 3, 4) being provided in the form of a screw conveyor (3, 4).

11. Apparatus in accordance with claim 10, characterised by the screw conveyor (3, 4) being provided in the form of a multiple screw conveyor.

12. Method of operating an apparatus in accordance with any of the preceding claims, characterised by comprising

- a) measuring the power delivered to the conveying means (2, 3, 4), and
- b) adjusting the variable restriction to achieving a predetermined power delivery to the conveying means (2, 3, 4).

13. Method in accordance with claim 12, characterised by further comprising

- c) measuring the pressure inside the extruder/pumping device (2, 3, 4), and
- d) using said measurement of the pressure as a parameter for the adjustment of the variable restriction.

14. Method of operating an apparatus in accordance with claim 12 or 13, characterised by further comprising measuring the flow of material and adjusting the variable restriction to achieve a constant relation between the power delivery to the conveying means and the flow rate of the material.

15. Method of operating an apparatus in accordance with claim 12, characterised by further comprising measuring the meal viscosity of the material and adjusting the variable restriction to achieve a constant relation between the power delivery to the conveying means and the meal viscosity of the material.

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